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THE MINERAL INDUSTRY OF VIRGINIA IN 1967[1]

A record-breaking output of coal more than offset value declines in most of the other mineral commodities, so that the total value of 1967 mineral production in Virginia rose to a new high of $283.6 million. The value was 3 percent greater than the $274.3 million reported in 1966, the previous record high value year. Reflecting slackened building activity were decreases in the production of commodities supplying the construction industries—stone, cement, sand and gravel, clay, and gypsum; the declines were moderate to substantial. Mineral fuels produced in the State in addition to coal included limited quantities of oil and natural gas; production of mineral fuels is confined to southwestern counties. Other mineral commodities produced included aplite, cement, clay, feldspar, gem stones, gypsum, kyanite, lime, iron ore (pigment material), lead and zinc ore, titanium concentrates (ilmenite and rutile), salt, sand and gravel, and stone (including soapstone and marine shell). Of the total 1967 value of mineral production in Virginia, 61 percent was contributed by fuels (56 percent in 1966), 36 percent by nonmetals (41 percent in 1966), and 3 percent by metals (3 percent in 1966).

The long-established trend of declining mine employment in Virginia was reversed in 1967; employment in the State's coal mines gained about 3 percent, according to the Virginia Division of Industrial Development. Coal mining is by far the most important section of Virginia's mining industry, accounting for over three-quarters of all mine employment.

Virginia's fuel capability was increased by the opening of a new coal mine (the Virginia-Pocahontas No. 1) which became initially productive in early 1967 and is expected to produce 2 million tons of metallurgical coal annually at full capacity. The mine is the second one developed by Island Creek Coal Company in the company's Pocahontas No. 3 seam metallurgical reserves (located in Buchanan County), which are estimated to exceed half a billion tons of low-volatile coal. The first mine, the Beatrice Pocahontas mine, a joint venture with Republic Steel Corporation, became initially productive in late 1963. A third mine, Virginia-Pocahontas No. 2, is under development by Island Creek Coal Company in the Pocahontas No. 3 seam. Initial production is scheduled for late 1968, and the projected full production and capacity rate for 2 million tons per year is expected by 1971.

Construction progressed substantially on a sixth coal-fired generating unit at Virginia Electric and Power Company's Chesterfield power station near Richmond. The new unit's capacity will nearly double the electrical energy output of the whole station and thus will substantially increase the tonnage of fuel consumed.

Construction of a new lightweight aggregate plant near Richmond was begun in 1967 by the

[1] Prepared by the Bureau of Mines, U. S. Department of the Interior, under a cooperative agreement with the Virginia Division of Mineral Resources for collecting information on all minerals except fuels.

Table 1.—Mineral production in Virginia.[1]

Mineral		1966 Quantity	1966 Value (thousands)	1967 Quantity	1967 Value (thousands)
Clays	thousand short tons	1,486	$1,813	1,382	$1,623
Coal (bituminous)	do	35,565	153,341	36,721	171,183
Gem stones		NA	7	NA	7
Lead (recoverable content of ores, etc.)	short tons	3,078	930	3,430	960
Lime	thousand short tons	840	10,486	829	10,345
Natural gas	million cubic feet	4,249	1,275	3,818	1,149
Petroleum (crude)	thousand 42-gallon barrels	1	W	3	W
Sand and gravel	thousand short tons	17,191	16,635	9,863	12,494
Soapstone	short tons	3,989	10	W	W
Stone	thousand short tons	34,151	55,550	31,324	52,470
Zinc[2] (recoverable content of ores, etc.)	short tons	17,666	5,123	18,846	5,088
Value of items that cannot be disclosed: Aplite, cement (portland and masonry), feldspar, gypsum, iron ore (pigment material), kyanite, salt, titanium concentrate (ilmenite and rutile), and data indicated by symbol W		—	29,127	—	28,366
Total		—	274,297	—	283,685

NA Not available. W Withheld to avoid disclosing individual company confidential data.

1 Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2 Recoverable zinc valued at the yearly average price of prime western slab zinc, East St. Louis market. Value established after transportation, smelting, and manufacturing charges have been added to the value of ore at the mine.

Wheelwright Corporation, a subsidiary of Penn Virginia Corporation of Philadelphia. The facility will be adjacent to the Chesterfield power station of Virginia Electric and Power Company and will utilize as raw material fly ash conveyed from the steam-generating plant. The product will be marketed to the concrete block and ready-mix concrete industries. Completion of the new plant is planned for early 1968.

Mineral Fuels

Coal (Bituminous).—Abetted by the ever-increasing demand for electrical energy, coal production increased in all but one (Buchanan) of the eight coal-producing counties and rose to 36.7 million short tons, 3 percent higher than the 35.6 million tons reported in 1966, the previous record output year. The year was also one of record value; the value of mine output increased 12 percent over that of 1966 and 11 percent over that of 1957, the former peak value year. The greater than proportional total value increase of the coal output was due to an 8 percent increase in the average value per ton ($4.66) in 1967 over the $4.31 reported in 1966. Production data includes coal produced from deposits within Virginia, whether the mine opening is or is not inside the State boundary and excludes operations producing less than 1000 tons per year. Consequently, production data published by the Federal Bureau of Mines may differ somewhat from data published by the State.

Both high- and low-volatile bituminous coals were produced for electric power generation, industrial heating, other industrial uses, coke feedstock, and export. A small quantity of semi-anthracite coal, mined in Montgomery County, was produced for domestic heating. Four of the eight southwestern counties in which coal was mined—Buchanan, Dickenson, Wise, and Russell—accounted for 97 percent of the total output compared with 98 percent in 1966. Buchanan County, where 62 percent of Virginia's coal mines were located, produced 42 percent of the State's output in 1967.

The State's record-breaking coal production was achieved with 215 fewer mines of all types than in 1966. Underground production accounted for 83 percent of the total output, 1 percent less than in 1966, but almost 755,000 additional tons of coal were mined with 218 fewer underground mines than the 1002 active in 1966. Eleven percent of the output was from strip mines (10 percent in 1966), and 6 percent was from auger mines (6 percent in 1966).

Coal was produced by underground mines in all the eight coal-producing counties and also by strip and auger mines in six counties. In order of output, Buchanan, Dickenson, Wise, and Rus-

sell counties led in underground mine tonnage; Wise, Dickenson, and Buchanan counties in strip-mine output; and Buchanan, Wise, and Dickenson counties in auger-mine production. The average value per ton for underground-mined coal was $4.92; for strip-mined coal it was $3.46; for auger-mined coal it was $3.20; and for the combined output by all three mining methods it was $4.66.

Of the total underground output, 80 percent was mechanically loaded, 13 percent higher than in 1966, reflecting the trend toward modernization and mechanization in underground mining in Virginia.

A total of 316 mobile loading machines (51 more than in 1966) accounted for 60 percent of the mechanically loaded tonnage; 94 continuous mining machines (14 more than in 1966) accounted for 37 percent; longwall machines and hand-loaded face conveyors accounted for the remainder. Of the total coal mined, 50 percent was mechanically cleaned in 37 plants (1 more than in 1966). Wet washing other than with jigs was the principal method of cleaning, accounting for 81 percent of the cleaned coal. Of the cleaned coal, 49 percent was thermally dried. Of the total coal mined, 40 percent was crushed. Sixteen percent of the total coal output was treated with dust-allaying and anti-freezing preparations, of which oil predominated (86 percent).

Coke.—Coal was converted to coke in beehive, Mitchell, and sole-flue ovens; no byproduct recovery was made. The coke was produced in six plants (five companies), one in Buchanan County and five in Wise County. Three plants in Wise County closed down in 1967.

Petroleum and Natural Gas.—Natural gas production data in Table 1 are reported to the Bureau of Mines by pipeline companies and are not necessarily comparable with data reported by State agencies. The production of natural gas for commercial use was 3818 million cubic feet, 10 percent less than that of 1966; the total value was $1,149,000 and the average wellhead value was $0.30 per Mcf. The output was delivered to the pipelines of Consolidated Gas Supply Corporation, the Atlantic Seaboard Line, and the Kentucky-West Virginia Gas Company. Natural gas was produced in three southwestern counties—Tazewell, Buchanan, and Dickenson. Tazewell County led in production with about 60 percent of the State's output. Buchanan County and Dickenson County contributed 25 percent and 15 percent, respectively. Compared with 1966, only Dickenson County had an increase in natural gas output, but this increase was more than offset by declines in the other producing counties. At the close of the year, 112 gas wells were operating, compared with 104 in 1966 and 99 in 1965. Reserves of natural gas were 37,798 million cubic feet, as reported by the American Gas Association. This is 212 million cubic feet more than reported in 1966.

During 1967, production of crude petroleum in Virginia totaled 3491 barrels, a substantial increase over the 1073 barrels produced in 1966. All production was from Lee County, with the Rose Hill field accounting for 1870 barrels, and the Ben Hur field for 1621 barrels. At year end, four oil wells were operating compared with six at the close of 1966, according to the Virginia Department of Labor and Industry, Division of Mines and Quarries.

Nonmetals

Aplite.—Interrupting an increasing trend, output and value were slightly less than those in 1966. Production of this feldspar commodity, chiefly for use in glass manufacture, was from two operations, one in Nelson County and one in Hanover County. A limited quantity of the material from a second operation in Nelson County was produced for use chiefly as an aggregate.

Cement.—Sales of portland cement declined for the third consecutive year. Shipments were 7 percent lower than in 1966, but value of shipments was only 1 percent lower, due to an average increase of $0.20 per barrel (376 pounds) over last year's average value per barrel of $2.97. Masonry cement shipments declined 8 percent and value of shipments by 7 percent; the average value per barrel (280 pounds) was slightly higher in 1967. Of the total cement shipped, including portland and masonry, portland cement accounted for 88 percent of shipments and 82 percent of the total value.

Portland cement plant capacity was virtually unchanged during the year. Four plants manufactured cement; three made both portland and masonry cement, and one plant produced only masonry cement. The wet process of manufacturing portland cement was used by one plant while two plants used the dry process. Cement was produced in Augusta, Botetourt, and Warren counties and the city of Chesapeake. Cement producers mined low-magnesian limestone, shale, clay, and

calcareous marl for their own use. Ingredients purchased for use in cement manufacture included sand, oyster shell, mill scale, gypsum, various air-entraining compounds, and a variety of grinding aids. Over four-fifths of the electrical energy used was purchased.

General-use and moderate-heat types (Types I and II) comprised the bulk of portland cement produced and marketed; a limited quantity of high-early-strength cement (Type III) was produced and shipped. Both air-entrained and non-air-entrained types were produced; the latter type accounted for most of the output. Most of the shipments were in bulk, and by railroad, but sizable shipments were also made by truck. Shipments of cement in containers (94-pound paper bags) were sizable and were made by railroad and truck.

For the various consumer uses, portland cement was distributed as follows: 58 percent to ready-mixed concrete companies (60 percent in 1966); 18 percent to concrete-products manufacturers (18 percent in 1966); 13 percent to contractors, including highway contractors (11 percent in 1966) and 11 percent to other users, including building material dealers, Federal, State, and local government agencies, and miscellaneous customers (11 percent in 1966). Slightly over two-thirds of portland cement shipments terminated within the State; the remainder, in order of decreasing shipments, was to North Carolina, West Virginia, Alabama, South Carolina, Maryland, Georgia, and Florida. Masonry cement shipments were to 28 states: chiefly Virginia, North Carolina, Maryland, West Virginia, South Carolina, and District of Columbia; 61 percent of shipments terminated in Virginia.

Clays.—Sharing in the decline of commodities supplying the construction industries, clay output and value were lower by 7 percent and 10 percent, respectively, than in 1966. About 68 percent of the clay and shale output was consumed in brick manufacture, compared with 69 percent in 1966. The principal uses for the balance were lightweight aggregate and in the manufacture of portland cement. Some was also consumed in the making of vitrified sewer pipe, flue linings, pottery, clay dummies (shot-hole tampers), and other clay products. Clay production was reported from 24 operations in 15 counties. The chief clay-producing counties in order of output were: Botetourt, Russell, Orange, Chesterfield, and Nansemond; in order of output value they were: Orange, Botetourt, Prince William, Nansemond, and Chesterfield. Five counties produced almost two-thirds of the State output, and five accounted for almost three-quarters of the value.

Feldspar.—Production was by one company from two mines in Bedford County. The output was substantially less than in 1966. The average market value was the same as in 1966, thus the drop in total value was also substantial. Mixed feldspar (soda and potash) was mined near the company's processing and grinding mill in Bedford. In order of decreasing tonnage, the mill output was marketed chiefly in Maryland, Ohio, Massachusetts, Pennsylvania, and New York, principally for pottery and ceramic-enamel manufacture, although smaller quantities were used in the manufacture of welding-rod coatings, soap and abrasives, and for brick glaze.

Gem Stones.—Mineral collectors and hobbyists collected a variety of semiprecious gems and mineral specimens from various Virginia counties. The rock and mineral varieties include agate, amazonite, blue corundum, lepidolite, olivine, staurolite, and unakite.

Gypsum.—Production of crude gypsum declined substantially compared with output reported in 1966. Gypsum, mined near Chatham Hill, Smyth County, and at Plasterco, Washington County, was calcined or otherwise processed and manufactured into plasterboard and other gypsum products by United States Gypsum Company at its Plasterco plant. The company also processed imported gypsum at a plant near Norfolk for use in their products. Imported gypsum was processed by several firms in the Norfolk area for use as a land dressing.

Kyanite.—Production of crude kyanite ore and sales of the refined material to manufacturers of refractories and other ceramic products decreased slightly. Two mines and three processing plants were operated by one company in the adjacent counties of Buckingham and Prince Edward. The company also operated a grinding and bagging plant in the latter county. Only a small part of the beneficiated kyanite (Al_2SiO_5) is used in the raw state; the bulk of production is calcined to mullite, one of the most important refractory materials used in the ceramic industry. Virginia is North America's leading producer of kyanite. Quartz sand, recovered during the beneficiation of the kyanite ore, was marketed by a subsidiary organization for industrial and construction applications.

Lime.—While output and value of lime declined slightly for the second consecutive year, 1967 was only 2 percent lower in both production and value than the record year of 1965. Compared with 1966, the output values were smaller for all uses of lime; the decreases were 17 percent for building lime, 6 percent for agricultural lime, and 1 percent for chemical and other industrial lime. All but 4 percent of lime sold or used, including both quicklime and hydrated lime, was consumed in chemical, metallurgical, or other industrial use. Ten companies in six counties and one independent city reported the production of primary lime. Giles, Smyth, and Shenandoah counties, in order of output, were the chief lime-producing areas, and their production accounted for 86 percent of the State's output of lime in 1967.

Processing equipment used in lime making included pot, shaft, and rotary kilns and batch and continuous hydrators. Raw materials included high-calcium limestone (predominantly), dolomitic limestone, and oyster shell. Fuels used included bituminous coal, coke, and natural gas. Virtually the entire output was high-calcium lime, of which 92 percent was used or marketed as quicklime and the remainder as the hydrated product. Uses for lime included the manufacture of alkalies, calcium carbide, and paper; flux in steel-making and electrometallurgical operations; sewage and trade-wastes treatment; purification and treatment of water; agricultural purposes; leather tanning; construction; and miscellaneous applications. Of the State's output, 38 percent was sold or used within Virginia, and the remainder was shipped principally to Florida, Georgia, Kentucky, Maryland, North and South Carolina, Ohio, Pennsylvania, Tennessee, Texas, and West Virginia.

Salt.—Chlorine, caustic soda, soda ash, and other chemicals were produced by Olin-Mathieson Chemical Corporation, Saltville, Smyth County, using brine recovered from nearby captive salt wells. Production of salt was moderately lower than in 1966. The company began modernization of its Saltville complex last year; the improvements include not only its chemical facilities but also the company's captive limestone and lime-making operations near the Saltville plant. When the modernization program is completed, soda ash production is expected to increase substantially with a parallel increase in salt and lime consumption.

Sand and Gravel.—A decrease in housing starts and road construction in Virginia in 1967 sharply reduced the demand for construction materials; production and value of sand and gravel declined 43 percent and 25 percent, respectively, compared with 1966, the record output year. The less severe total value decline was due to an increase of $0.30 in the average value per ton over the $0.97 of last year. All but about 5 percent of the total output was consumed in construction applications, for which about 9 million tons were required, compared to almost 17 million tons in 1966.

Commercial output comprised 98 percent of total production and value; the remainder was State and local government output, mainly for highway maintenance. Of the commercial production, 47 percent was used in paving and 39 percent in building. Other sand and gravel uses included fill material and miscellaneous and unspecified applications. Sand comprised 59 percent of the total commercial sand and gravel output and 50 percent of the total commercial value. While less than one-tenth of the sand output was marketed as special industrial silica sands used for glass manufacture, engine sand, filler, and other nonconstruction uses, about two-tenths of the value of sand output was attributed to these market uses.

Eighty-nine percent of the total commercial sand and gravel output was screened, washed, or otherwise processed, compared with 83 percent in 1966. Of the 78 commercial sand and gravel operations reporting, 55 processed their output at 41 stationary, 11 portable, and 3 dredging installations. The remaining 23 operations recovered unprocessed material. Of the commercial tonnage, 60 percent was shipped by truck, and most of the remainder by railroad or waterway; a small quantity was used at the processing plant or transported by unspecified methods.

Production of sand and gravel was reported from 36 counties and 2 independent cities, compared with 30 counties and 3 independent cities in 1966. In order of output, the principal sand-and-gravel-producing areas were Henrico, Fairfax, and Chesterfield counties, the independent city of Virginia Beach, and Prince George County. Almost three-quarters of both the total output and value were contributed by these five producing areas. Of the 78 commercial sand and gravel operations reporting in 1967 (60 in 1966), 3 had

an output range of from 500,000 to 1 million tons and accounted for 26 percent of the total commercial output; 21 had an output range of from 100,000 to 500,000 tons and accounted for 54 percent; 19 had an output range of from 50,000 to 100,000 tons and accounted for 13 percent; and 35 had an output range of up to 50,000 tons and accounted for 7 percent. The number of operations producing less than 50,000 tons of sand and gravel annually was over double those in 1966. The bulk of sand and gravel recovery was by dredging and open-pit mining; a sizable tonnage of industrial silica sand was produced from crushed sandstone and quartzite, and a limited quantity was obtained in the beneficiation of kyanite ore.

Soapstone.—Crushed and ground soapstone was produced by Blue Ridge Talc Company, Inc., near Henry, principally for use in insecticides and foundry facings. Output and value were moderately less than in 1966. Soapstone used as a dimension stone is included with miscellaneous stone in the following section.

Stone.—Stone, after coal the second most important mineral commodity produced in Virginia, accounted for 18.5 percent of the State's total value of mineral production in 1967 (20.3 percent in 1966). Compared with 1966, production and value declined 8 percent and 6 percent, respectively. Largely responsible for the decline in production and value was a lower demand for construction aggregates (concrete aggregate and roadstone); a decreased output of limestone-derived products, in addition to aggregates, was also contributory.

Varied types of stone were mined or quarried in the State; in order of output value they were: limestone (including dolomite), granite, basalt (including diabase), slate, miscellaneous stone (including amphibolite, schist, soapstone, and "Virginia Greenstone"), sandstone (including quartzite and quartz), calcareous marl, and marble. Both crushed or broken stone and dimension stone were produced. Marine shell (oyster shell) was also produced, chiefly by dredging shell deposits in Chesapeake Bay; a limited quantity was obtained as a coproduct of oyster processing.

Crushed stone comprised virtually all of the total output (99.8 percent) and the major share of the total value (91.2 percent). Crushed stone was produced from all the stone varieties. Of the total crushed stone output, 22.9 million tons were used for building purposes (concrete aggregate and roadstone) compared with 24.6 million tons in 1966, reflecting the lower tempo of construction activity in 1967. Crushed stone prepared from limestone, granite, and basalt, the three leading stone varieties in order of output and value, accounted for 94 percent of total stone output and 86 percent of total value. Of the total crushed stone output, 73 percent was used as concrete aggregate and roadstone, 11 percent was limestone used in cement and lime manufacture, 3 percent was used as fluxstone (limestone), and the remainder was used as agricultural dressings, railroad ballast, riprap, stone sand, and in miscellaneous and unspecified applications.

Of the three leading crushed stone varieties, only basalt (including diabase) gained in output (28 percent) and value (27 percent). Granite declined 13 percent in output, but due to a higher unit value in 1967, only 10 percent in value. Limestone declined 8 percent in output and 9 percent in value. Reduced demand for both granite- and limestone-derived construction aggregates and for other limestone products was responsible for the declines in output. Compared with 1966, the output of limestone for agstone, cement and lime manufacture, fluxstone, railroad ballast, and miscellaneous uses was about 1 million tons lower. Of the five remaining crushed stone varieties, three gained and two declined in output. Sandstone declined 45 percent in output but only 28 percent in value because of a higher unit value in 1967. Miscellaneous stone declined substantially in output and value. Slate, calcareous marl, and marble all gained slightly in output and value. Crushed slate was used in producing lightweight aggregate, roofing granules, and as roadstone; the calcareous marl was used mainly in cement manufacture, and the marble was produced for use as terrazzo. Oyster shell, the bulk of which was dredged from the Chesapeake Bay area, decreased substantially in output and value. The decline was due chiefly to cessation of a dredging operation in midsummer of 1967. The shell was used mainly in the manufacture of cement and agricultural lime and for oyster bed replanting, poultry grit, and roadstone.

Four of the stone varieties were also used to produce the dimensioned product. In order of output value, they were miscellaneous stone (amphibolite, schist, soapstone, and "Virginia Greenstone"), slate, diabase, and sandstone. Three gained in output value and one declined.

Miscellaneous stone declined slightly in output and slate gained slightly; both gained moderately in value, due principally to higher prices received for the dimensioned products in 1967. Laboratory and architectural stone and flagging were the principal products derived from the soapstone. The output of "Virginia Greenstone" included rough and dressed building stone and dressed refractory stone (bakery oven hearthstones). Production of these two miscellaneous stone varieties was confined to one county and one independent city. A limited quantity of dimension stone was produced from the other two miscellaneous varieties, amphibolite and schist, in two counties. Slate for roofing, structural and sanitary use, flagging, wall facing, and flooring tile was produced in one county. Diabase was produced as dimension stone in one county; output and value were substantially lower in 1967. A limited output of dimension sandstone was produced in two counties; output and value increased in 1967.

Commercial stone production, including marine shell, was reported from 55 counties and 1 independent city. The principal stone producing counties, in terms of output, were Botetourt (crushed limestone), Loudoun (crushed diabase), Augusta (crushed limestone and sandstone), Frederick (crushed limestone), and Tazewell (crushed limestone). In terms of product value, the most important counties were Botetourt, Loudoun, Buckingham (dimension and crushed slate), Giles (crushed limestone, largely for lime making), and Frederick. Twenty-eight percent of the total stone output was contributed by five counties, and five counties accounted for almost 29 percent of the output value. In 1967, commercial production of limestone was reported from 23 counties, granite from 19, basalt and diabase from 7, sandstone (including quartzite and quartz) from 12, slate from 1, calcareous marl from 2, miscellaneous stone from 3, and marble from 1. Oyster shell was produced in 1 independent city and 1 county. Twelve counties (11 in 1966) produced more than 1 million tons of stone, and there were 21 counties with output valued in excess of $1 million each (23 in 1966). Crushed stone was produced in all but one of the producing counties, and in one independent city; dimension stone was produced in six counties. Government-and-contractor stone was produced in seven counties and accounted for less than 1 percent of the total stone output and value.

Metals

Iron Ore (Pigment Material).—Natural iron oxide pigments were produced by one firm at Hiwassee, Pulaski County, from local deposits of earthy forms of hydrous and anhydrous iron oxides—ocher, sienna, and umber. More than 100 different colors are produced at the Hiwassee plant by combination of raw, burnt, and blended ochers, siennas, and umbers. Manufactured iron oxides, for use in pigment manufacture and in magnetic-tape manufacture, were produced at the company's Pulaski facilities. Natural iron oxide pigments were also produced from out-of-State hematite by a firm at Henry, Henry County. The finished iron oxide pigments are used in paints, printing inks, fertilizers, foundry facings, cement, and other products. Total marketed output of both natural and manufactured iron oxide pigments was substantially less than in 1966, but a higher unit value in 1967 partially offset the production decline, resulting in only a moderate decrease in total value.

Lead and Zinc.—Production of lead and zinc ore was limited to two mines in Wythe County, operated by New Jersey Zinc Company. Output of the crude lead-zinc ore was greater than in 1966 and the production of recoverable lead and zinc was higher by 11 percent and 7 percent, respectively, in 1967. Lead rose only 3 percent in total value due to a decrease of 7 percent in unit value. A decline of 7 percent in the unit value of zinc more than offset the production gain, resulting in a slight decline in total value.

Titanium Concentrates.—Marketed production of titanium concentrates rose 19 percent and value of shipments increased 14 percent, compared to 1966. The gain in total shipments and value was due entirely to ilmenite, which comprised the bulk of marketed production; rutile declined moderately in both shipments and value. Both the ilmenite ($FeTiO_3$) and rutile (TiO_2) are used in the manufacture of titanium dioxide pigments, which, in turn, are used in producing paints, lacquers, plastics, paper, rubber, textiles, linoleum, and many other materials. Ilmenite was produced by American Cyanamid Company, Pigments Division, in Amherst County, and both ilmenite and rutile were produced by M & T Chemicals, Inc., in Hanover County.

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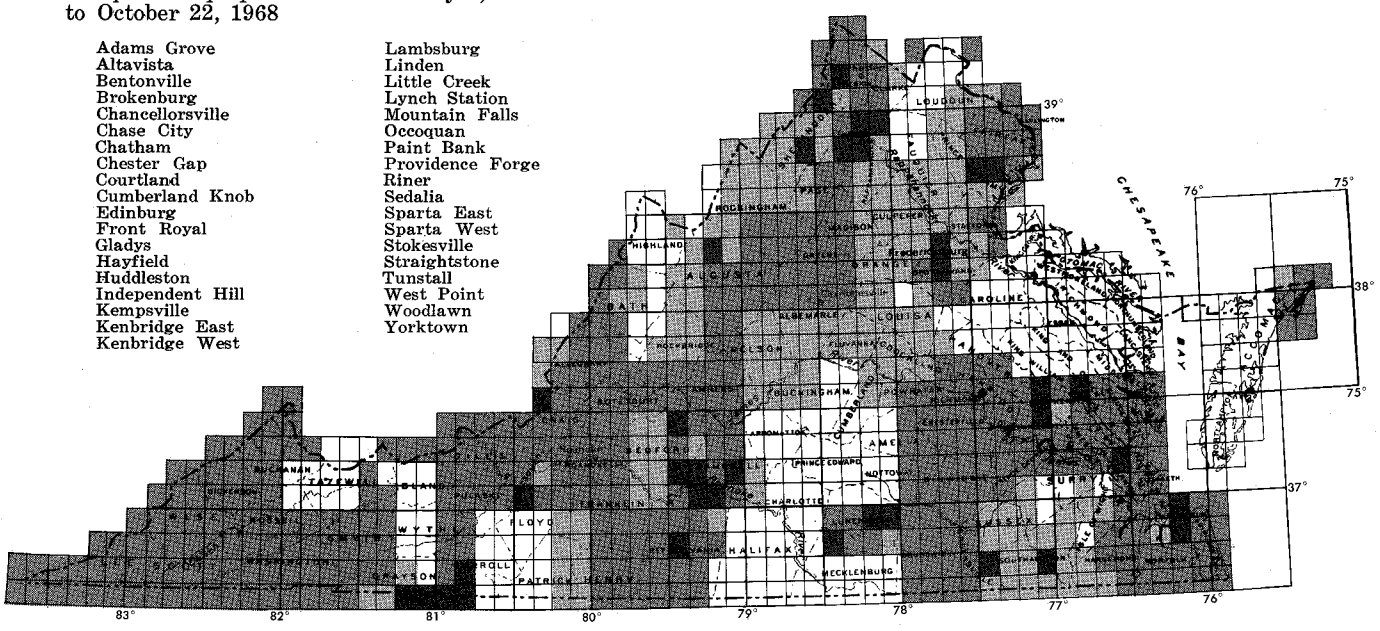

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